



Dell EqualLogic Host Integration Tools for Microsoft

Release Notes

Version 4.7.1

© Copyright 2008-2014 Dell Inc. All rights reserved.

Dell™ and EqualLogic® are trademarks of Dell Inc.

All trademarks and registered trademarks mentioned herein are the property of their respective owners.

Information in this document is subject to change without notice.

Reproduction in any manner whatsoever without the written permission of Dell is strictly forbidden.

Published: August 2014

Part Number: 110-6214-EN-R1

Table of Contents

Preface	vii
1 Introduction to Host Integration Tools for Microsoft	1
Minimum Required Firmware and Software Revisions	2
Supported Versions of the Windows Operating System	4
Microsoft iSCSI Initiator	4
Network Requirements and Recommendations	5
Best Practices Recommendations	5
2 Issues Corrected in Host Integration Tools for Microsoft	7
3 Usage Constraints	11
Operating System Issues and Constraints	11
Windows Server 2012 (or Higher) and Windows 8 (or Higher) Constraints	11
Windows Server 2008 R2 Constraints	12
Windows Server 2008 Constraints	14
Networking Constraints	16
iSCSI Initiator Constraints	18
General Constraints on Operations	19
Remote Verification	19
Failover and Failback	19
Dynamic Disks	19
Local Language Support	19
SCVMM Issues and Constraints	20
Application Issues and Constraints	20
Microsoft Exchange Server Constraints	20
SQL Server Constraints	21
Hyper-V Constraints	22
4 Known Issues	25
Known Issues in HIT/Microsoft version 4.7.1 and 4.7.0	25
Auto-Snapshot Manager Issues	25

Windows 2012 R2 Hyper-V Cluster Smart Copy Collections Fail During Selective Restore	25
Data Center Bridging Limitations of Some Switches	26
Adding EQL SMP as a Storage Provider on the VMM Server Fails when Using SSO on Windows Server 2012 R2 with SCVMM 2012 R2	26
Mount/Unmount Options is Disabled for Microsoft Exchange Replica Smart Copies	26
Documentation Omits Information on All Volume Types Supported by ASM	27
Known Issues Fixed Since the Previous Release (HIT/Microsoft Version 4.6)	27
Selective Restore Is Enabled	27
Creating a Thin Clone from a Template Volume with a Non-default RAID Preference	27
ASM/ME GUI and SharePoint Clone Smart Copies	27
The Restore All Operation Now Works Correctly on Smart Copies where the Hostname is Longer than 15 Characters	27
Bulk Smart Copy support was Added for the SharePoint Other Databases Option in the CLI	27
Multi-Path I/O Large Configuration Handling	27
Online Help Enhancements	28
Known Issues and Constraints in HIT/Microsoft Version 4.6	28
Installation	28
PowerShell Tools	29
Dell EqualLogic VDS Provider	30
Dell EqualLogic VSS Provider	30
Remote Setup Wizard	31
Multipath I/O DSM	32
Auto-Snapshot Manager	35
Tools and Utilities	38
SAN Boot Volume	38
Appendix A Third-Party Copyright Information	41
Boost 1.52	41
Cryptographic Software	41
DotNETZipLib	42

MIT Kerberos License	43
OpenSSL	44
OpenSSL License	44
SimpleINI	45
Thrift	45
WinPCAP	51

Preface

Dell™ EqualLogic® Host Integration Tools for Microsoft (HIT/Microsoft) enable you to manage and configure Dell EqualLogicPS Series storage arrays from the servers using them. HIT/Microsoft allows server administrators to initialize new arrays, create application-consistent snapshots, script management operations, and perform many other tasks.

Audience

The information in these release notes is intended for administrators using HIT/Microsoft to manage their data on PS Series arrays.

Related Documentation

For detailed information about PS Series arrays, groups, volumes, array software, and host software, log in to the [Documentation page](#) at the customer support site.

Dell Online Services

You can learn about Dell products and services using this procedure:

1. Visit <http://www.dell.com> or the URL specified in any Dell product information.
2. Use the locale menu or click on the link that specifies your country or region.

Dell EqualLogic Storage Solutions

To learn more about Dell EqualLogic products and new releases being planned, visit the Dell EqualLogic TechCenter site: <http://delltechcenter.com/page/EqualLogic>. Here you can also see articles, demos, online discussions, and more details about the benefits of our product family.

Technical Support and Customer Service

Dell support service is available to answer your questions about PS Series SAN arrays and FS Series appliances.

Contacting Dell

If you are a customer in the United States or Canada in need of technical support, call 1-800-945-3355. If you are outside of the United States or Canada, visit [Dell EqualLogic Product Support](#).

If you have an Express Service Code, have it ready. The code helps the Dell automated support telephone system direct your call more efficiently.

1 Introduction to Host Integration Tools for Microsoft

This document contains important product information and restrictions for the Dell™ EqualLogic® Host Integration Tools for Microsoft® version 4.7.1 software kit.

This maintenance release provides limited support for Microsoft SQL Server® 2014, described in *Features in this Release (HIT/Microsoft version 4.7.1) on page 1*.

Host Integration Tools includes the user-selectable components described in [Table 1](#).

Table 1: Host Integration Tools Components

Component	Description
Remote Setup Wizard (RSW)	Initializes a PS Series storage array
Remote Setup Command Line Interface (RSWCLI)	Provides a command-line alternative to the Remote Setup Wizard. Also enables you to configure multipath I/O settings and configure access to a PS Series group.
Multipath I/O device specific module (MPIO/DSM)	Supports redundant network paths between a computer and the PS Series group for high availability and high performance
Auto-Snapshot Manager/ Microsoft Edition (ASM/ME)	Creates and manages Smart Copies (snapshots, clones, and replicas of PS Series iSCSI volumes). Use the alternate command-line interface (ASMCLI) for custom operations and scripting.
VSS Provider	Used by Volume Shadow Copy Service (VSS) to manage application-consistent Smart Copies
Virtual Disk Service (VDS) Provider	Used by Microsoft VDS version 1.1 and Storage Manager for SANs to create and manage volumes in a group
Storage Management Provider (SMP)	Manages storage groups on the Windows 8 or greater operating system and the Windows Server 2012 or greater operating system
PowerShell Tools	Manages one or many PS Series groups through a comprehensive set of PowerShell Tools cmdlets

Features in this Release (HIT/Microsoft version 4.7.1)

This release provides limited support for Microsoft SQL Server® 2014. All SQL database configurations supported by HIT/Microsoft 4.7.0 are supported, including:

- SQL databases on EqualLogic storage on standalone servers
- SQL databases on EqualLogic storage on standard cluster volumes

SQL databases in AlwaysOn Availability Groups continue to have no restore support for SQL 2012 and later.

This release also supports Memory Optimized Tables (In-Memory OLTP).

Additional configurations offered by SQL 2014 are **not** supported, which include:

- SQL databases on Cluster Shared Volumes
- SQL databases on Windows Azure Storage

Features in HIT/Microsoft Version 4.7.0

- PS Series firmware v7.0 support: 4K-byte sector drives, access groups
- Support for Windows Server 2012 R2 and Windows 8.1
- Support for Microsoft Exchange 2013 CU2 and Microsoft Exchange Server 2010 SP3
- Support for System Center Virtual Machine Manager (SCVMM, or VMM) 2012 R2 with the Dell EqualLogic Storage Management Provider (SMP) for PS Series arrays.
- Auto-grouping multiple hosts (SharePoint farms, clusters, hosts) and the ability to assign aliases to SharePoint farms, clusters, or hosts. For more information about these features see the *Dell EqualLogic Auto-Snapshot Manager/Microsoft Edition User's Guide*.
- New PowerShell cmdlets for ASMCLI and RSWCLI. The new cmdlets offer access to ASM, RSW, and MPIO settings functionality through PowerShell. The corresponding PowerShell module for each feature is installed when you install that feature. For more information about these new cmdlets, see the *Dell EqualLogic PowerShell Tools Reference Guide*.

Minimum Required Firmware and Software Revisions

[Table 2](#) lists the minimum revisions of application software and firmware supported by Host Integration Tools. You cannot use an unsupported instance of an application (such as SQL) on the same computer as a supported instance. Doing so might cause Host Integration Tools to operate incorrectly. Host Integration Tools supports only the Host Bus Adapters (HBAs) specified in [Table 2](#).

Note: During installation, the Host Integration Tools kit disables the MPIO Path Verification for devices claimed by the Dell EqualLogic MPIO DSM. This step prevents a potential problem that could introduce a delay in reconnecting to iSCSI volumes during a Dell EqualLogic PS Series firmware upgrade or controller failover. If you are using the Host Integration Tools with failover clustering in a Microsoft Windows Server® 2008 R2 environment and are planning to upgrade your PS Series firmware to version 5.0.2 or higher, it is recommended that before upgrading the firmware, you upgrade the Host Integration Tools on all cluster nodes to HIT version 3.4.2 or higher.

Table 2: Minimum Software and Firmware Revisions

Product	Revision
PS Series firmware	For all operating systems, use PS Series firmware version 5.2.x or higher
PowerShell® Tools	PS Series firmware version 5.0 or higher
Windows PowerShell Tools	Windows PowerShell Tools version 2.0, 3.0, and 4.0 are supported
Microsoft SharePoint®	SharePoint 2010 SP1 SharePoint 2013
Microsoft Exchange Server®	Microsoft Exchange Server® 2010 SP3 Microsoft Exchange Server® 2013
Microsoft Virtual Disk Service (VDS)	Version 1.1
Microsoft SQL Server® (SQL Express is unsupported)	Microsoft SQL Server® 2008 SP3 Microsoft SQL Server® 2008 R2 SP2 Microsoft SQL Server® 2012 SP1 Microsoft SQL Server® 2014—All SQL configurations supported by HIT/Microsoft 4.7.0 are supported in this release, as well as Memory Optimized Tables. However, additional configurations offered by SQL 2014 are not supported, which include: • SQL databases on Cluster Shared Volumes • SQL databases on Windows Azure Storage.
Microsoft Hyper-V®	Microsoft Windows Server® 2008 SP2 Microsoft Windows Server® 2008 R2—For CSV-enabled clusters, the following Microsoft hotfix must be installed: see http://support.microsoft.com/kb/979710 . The hotfix is included in Windows Server 2008 R2 SP1. Microsoft Windows Server® 2012 Microsoft Windows Server® 2012 R2
Microsoft System Center Virtual Machine Manager (SCVMM)	SCVMM 2012 R2 SCVMM 2012 SP1 GA with UR1 (Build 3.1.6018.0), with VDS fix (see http://support.microsoft.com/kb/2785094), and DSM running on all systems
QLogic® QLA405x and QLE406x iSCSI initiator HBAs	Firmware 3.0.1.49 and BIOS 1.14 with Windows driver 2.1.4.26 On the QLogic driver downloads page, follow the link for Dell EqualLogic specific models.
Broadcom® NetXtreme II iSCSI initiator HBA	Version 12.8 driver suite

Supported Versions of the Windows Operating System

Table 3 and Table 4 list supported versions of the Windows operating system and identify Host Integration Tools components that do not support specific operating system versions. Host Integration Tools do not support evaluation versions of Windows or any version not listed in Table 3 and Table 4.

Notes: Host Integration Tools support both 32-bit and 64-bit versions of the Windows operating system. However, the tools do not support the IA-64 (Intel® Itanium® architecture) versions of the Windows operating system. See also [General Constraints on Operations on page 19](#).

Table 3: Windows Desktop Operating System Support¹

Component	Windows 7 SP1	Windows 8 ³	Windows 8.1
RSW	Yes	Yes	Yes
Remote Setup CLI	Yes	Yes	Yes
MPIO/DSM ²	No	No	No
ASM/ME ³	No	No	No
VSS Provider	No	No	No
VDS Provider	No	No	No
PowerShell Tools	Yes	Yes	Yes
Storage Management Provider (SMP)	No	Yes	Yes
Rethinning driver	No	No	No

Table 4: Windows Server® Operating System Support¹

Component	Server 2008 SP2	Server 2008 Core	Server 2008 R2 with SP1	Server 2012	Server 2012 R2
RSW	Yes	Yes	Yes	Yes	Yes
Remote Setup CLI	Yes	Yes	Yes	Yes	Yes
MPIO/DSM ²	Yes	Yes	Yes	Yes	Yes
ASM/ME ³	Yes	No	Yes	Yes	Yes
VSS Provider	Yes	Yes	Yes	Yes	Yes
VDS Provider	Yes	Yes	Yes	Yes	Yes
PowerShell Tools	Yes	Yes	Yes	Yes	Yes
Storage Management Provider (SMP)	No	No	No	Yes	Yes
Rethinning driver	No	No	Yes	No	No

1. Host Integration Tools support both 32-bit and 64-bit versions of the Windows operating system. However, the tools do not support the IA-64 (Intel Itanium® architecture) versions of the Windows operating system. See also [General Constraints on Operations on page 19](#).

2. Web Server Editions of Windows 2008 do not support MPIO/DSM because MPIO is not supported in this operating system.

3. See also [General Constraints on Operations on page 19](#).

Microsoft iSCSI Initiator

The Microsoft iSCSI initiator is a required component.

Network Requirements and Recommendations

Best Practices Recommendations

To ensure a secure network environment, Dell strongly recommends the following precautions:

- The network environment in which the group resides, including hardware such as switches and routers, should be secure from network attacks such as packet sniffing or connection hijacking. Firewalls and network isolation should be employed to protect resources. Network security can be achieved in a number of ways depending on the level of assurance needed and the types of network attacks to be expected. Security mechanisms include physical security, application-level encryption (SSL/TLS and SSH), and/or IP-level encryption (IPsec).
- Network protocols and services used by the group, including RADIUS authentication, Network Time Protocol (NTP), syslog, and outbound SMTP traffic, should be secure and not subject to attacks.

2 Issues Corrected in Host Integration Tools for Microsoft

Issues Corrected in This Release

- Previously, after upgrading to HIT/Microsoft Version 4.6 or later, existing schedules from earlier versions were not displayed by ASM because ASM only displayed schedules from the EqualLogic folder in the Windows Task Scheduler. In Version 4.5 or earlier, ASM displayed schedules from the top-level folder in the Windows Task Scheduler. ASM now automatically moves the schedules from the top-level folder to the EqualLogic folder, resolving this issue. However, some schedules cannot be automatically moved by ASM in this manner and will be identified as in error. In this case, use the following workaround:
 - a. Export the existing schedules from the Windows Task Scheduler top-level folder.
 - b. Import the schedules into the EqualLogic folder.
 - c. Delete the earlier-versions schedules from top folder.
- Previously, a foreign language host system running an ASM Smart Copy schedule failed on Cluster Shared Volumes. This condition occurred because ASM looked for the "Available Storage" group, but on foreign language systems, the translated name of this group was used. This issue has been resolved.

Issues Corrected in HIT/Microsoft Version 4.7

The following issue has been fixed since Dell EqualLogic Host Integration Tools for Microsoft (HIT/Microsoft) version 4.7, released April 2014:

Previously, Hyper-V vNICs on a Windows 2012 R2 host could cause the included and excluded subnets to not display properly in Auto-Snapshot Manager's MPIO Settings view. The issue has been resolved.

Selective restore of Hyper-V objects was disabled in HIT/Microsoft Version 4.7 EPA and has been re-enabled in the final production version of HIT/Microsoft Version 4.7.

Previously, two problems caused the EqlReqService to intermittently crash. These problems have been fixed.

Auto-Snapshot Manager (ASM)

- ASM now allows Exchange verification of replica Smart Copies on the same host that created the Smart Copy.
- Previously, a display issue occurred during Exchange verification of collections whose name included the ampersand character (&). This problem has been resolved.
- ASM no longer allows the user to unmount volumes that are in use by an Exchange Recovery Storage Group.
- Previously, the "All Hosts" node in ASM sometimes did not display any hosts. This problem has been resolved.
- Previously, ASM sometimes performed continuous refresh operations when replication partners had different firmware versions. This problem has been resolved.

- If no default browser is set, ASM defaults to Internet Explorer when trying to display help.
- ASM no longer waits indefinitely for a response from a remote server that shut down unexpectedly.
- Previously, when you attempted to start two instances of ASM, an error message would display. This problem has been resolved.
- Smart Copies of promoted replicas are now enumerated properly by the ASMCLI.
- When a single replica in a multivolume replica Smart Copy fails, ASM now tracks the Smart Copy as a partial replica so that the ASM keep count stays in sync with replicas that were created successfully. Partial replica Smart Copies are given preference for deletion when ASM maintains the schedule keep count as long as the partial replica is not the most recent replica (which can never be deleted).
- When a user modifies both the contents and the name of a collection, ASM now properly saves the content changes as well as the name change.
- The `-enableall` and `-disableall` options of the ASMCLI `-alert` command now properly enable or disable all alerts of the specified type.
- Previously, the CPU would have a usage spike every 30 seconds on SQL 2012 configurations. This problem has been resolved.
- ASM no longer attempts to unmount and delete permanently promoted replicas when deleting the Smart Copy that originally created the replica.

Selective Restore Is Enabled

The selective restore feature in Hyper-V is enabled in 4.7. The feature was disabled in the 4.7 EPA.

MPIO

- Previously, a discrepancy occurred between the iSCSI connection count display in ASM and the EqualLogic MPIO tab in the iSCSI initiator. This problem has been resolved.
- Previously, too many sessions were created occasionally on Windows boot volumes. This problem has been resolved.
- Previously, in some configurations involving large numbers of volumes, and sometimes 10GB connections using the Dell Equallogic Multi-Path I/O Dsm, small volumes that were located on a multi-member Equallogic array might have been given only a single iSCSI connection instead of at least two iSCSI connections. This problem has been resolved.

Powershell Tools

The `Get-EqlPool` no longer returns the management IP address in the `GroupAddress` field when the management network is enabled.

Miscellaneous

- The EqualLogic VSS Hardware Provider now properly deletes snapshots created by third-party backup applications.
- You can now install MPIO without also installing the Remote Setup Wizard.

- The <install_dir>\bin directory has been added to the PATH variable so that commands such as ASMCLI can be run without having to specify the path to them.
- Creating VMs from VM templates in SCVMM no longer fails with the following error when the source volume is a template volume whose RAID preference is not set to Automatic:

Creating snapshot of storage logical unit <template-volume-name> failed with error code SM_RC_UNKNOWN_ERROR. Thin clone RAID preference is inherited from the template and cannot be modified.

- The Dell EqualLogic Host Integration Tools for Microsoft online help now correctly displays on Windows 2012 R2 machines when you try to open the help from your local machine.

3 Usage Constraints

Operating System Issues and Constraints

This section describes issues for the operating systems supported by the Host Integration Tools.

Windows Server 2012 (or Higher) and Windows 8 (or Higher) Constraints

This section describes known issues and usage constraints that are specific to Windows Server 2012 (or higher) and Windows 8 (or higher) operating systems.

See also [*Incorrect Report of a Device as In Use on page 15*](#).

VMM: Selective Restore of a rapid provisioned HA VM smart copy fails with error

You cannot perform a selective restore operation on VM components that are on volumes without mount points, because the selective restore operation uses file copy operations but the volume does not have a mount point. The files are in `\\?\{GUID}` format.

Unsupported PowerShell cmdlets for Windows 8 (or Higher) or Windows Server 2012 (or Higher)

The Storage Management Provider (SMP) does not support the following Microsoft PowerShell cmdlets in Windows Server 2012 or higher and Windows 8 or higher:

- `New-StoragePool`
- `Remove-StoragePool`
- `Add-PhysicalDisk`
- `Add-VirtualDiskToMaskingSet`
- `Rename-MaskingSet`
- `Repair-VirtualDisk`
- `Set-PhysicalDisk`
- `Set-ResiliencySetting`
- `Reset-PhysicalDisk`
- `Remove-InitiatorId`

Cluster Shared Volumes VSS Writer Fails to Report Remote VMs

Under some circumstances the Cluster Shared Volume (CSV) VSS Writer in Windows Server 2012 does not report remote VMs. This omission results in remote VMs not being included in Smart Copies of Cluster Shared Volumes.

The cause of the problem is multiple requestors querying the components at the same time. The probability of having the problem can be reduced by closing ASM/ME GUI windows when they are not in use and making sure that Smart Copy schedules do not overlap.

Windows Server 2008 R2 Constraints

This section describes known issues and usage constraints that are specific to Windows Server 2008 R2.

Must Install HIT in Each VM in Windows 2008 R2 CSV Configuration

For Smart Copies of VMs to work correctly in a Windows Server 2008 R2 configuration using Cluster Shared Volumes (CSVs), the Host Integration Tools must be installed in each VM.

This requirement applies to all such configurations, including Enterprise, Datacenter, Core, or any other Microsoft Server release configuration.

The requirement applies whether you start the Smart Copy operation or create a schedule from the VM or the Volume node in the ASM/ME GUI.

If the Host Integration Tools are not installed on each VM, you can create a Smart Copy but an error is displayed stating that ASM/ME could not open a connection to the VM. The Smart Copy will not be file system consistent, but will be crash consistent with respect to the file system in the VM. You might have to run the `chkdsk` utility the next time the VM restarts.

Server Crash with Stop Error 0x0000000A

When using the Microsoft iSCSI initiator on Server 2008 R2, you might experience a stop error with error code 0x0000000A in the MSiSCSI.sys driver. To resolve this issue, choose one of the following actions:

- Upgrade to Service Pack 1
- Install a separate hotfix that is available from Microsoft. More information is available at <http://support.microsoft.com/kb/979711/en-us>.

VSS Shadow Copy Operations Failure

When using the new VSS LUN resynchronization feature in Windows Server 2008 R2, you might see failures to create Smart Copies if you perform the following sequence of actions:

1. Create VSS shadow copy of LUN_A.
2. Resynchronize LUN_A.
3. Create a VSS shadow copy of LUN_B.

The operation in step 3 might fail. To recover from this failure, re-create the shadow copy of LUN_B.

Intermittent VSS LUN Resynchronization Errors

When using the VSS LUN resynchronization feature in Windows Server 2008 R2, you might see intermittent failures accompanied by the following error messages in the event log:

```
Log Name:      Application
Source:        VSS
Date:          6/16/2009 2:43:31 PM
Event ID:      8193
Task Category: None
Level:         Error
Keywords:      Classic
```

```

User:          N/A
Computer:      WS08R2
Description:
Volume Shadow Copy Service error: Unexpected error calling routine
IVssCoordCallback::SetContent. hr = 0x80042311, The given XML document is invalid. It is either
incorrectly-formed XML or it does not match the schema.

Operation:
    PostSnapshot Event
    Executing Asynchronous Operation

Context:
    Execution Context: Provider
    Provider Name: DELL EqualLogic VSS HW Provider
    Provider Version: 3.3.0.4775
    Provider ID: {d4689bdf-7b60-4f6e-9afb-2d13c01b12ea}
    Current State: DoSnapshotSet

```

To recover from this error, retry the VSS shadow copy operation.

For more information, read the Microsoft Knowledge Base article at:

<http://support.microsoft.com/kb/976099/>

iSCSI Initiator Errors During LUN Resynchronization

When using the VSS LUN resynchronization feature in Windows Server 2008 R2, you will see errors from the iSCSI initiator in the windows event log. The error messages indicate that the iSCSI sessions closed and the initiator is unable to reconnect. The event log entry appears similar to the following example:

```

Log Name:      System
Source:        iScsiPrt
Date:          5/26/2009 7:45:50 PM
Event ID:      32
Task Category: None
Level:         Information
Keywords:      Classic
User:          N/A
Computer:      hit-win7x64
Description:
Initiator received an asynchronous logout message. The Target name is given in the dump data.
Event Xml:
<Event xmlns="http://schemas.microsoft.com/win/2004/08/events/event">
  <System>
    <Provider Name="iScsiPrt" />
    <EventID Qualifiers="16384">32</EventID>
    <Level>4</Level>
    <Task>0</Task>
    <Keywords>0x8000000000000000</Keywords>
    <TimeCreated SystemTime="2009-05-27T02:45:50.711130200Z" />
    <EventRecordID>1166</EventRecordID>
    <Channel>System</Channel>

```

```
<Computer>hit-win7x64</Computer>  
  <Security />  
</System>  
  <EventData>  
    <Data>\Device\RaidPort0</Data>  
<Binary>00008C0001000000000000002000004000000000000000000000000000000000000000000000  
690071006E002E0032003000300031002D00300035002E0063006F006D002E0065007100750061006C006C00  
6F006700690063003A0030002D003800610030003900300036002D0061003500350036003000390065003000  
32002D0035003500300033003200370064003500650035006200340039006500630064002D00770069006E00  
370076006F006C00</Binary>  
</EventData>  
</Event>
```

This behavior is expected when performing a LUN resynchronization. You can ignore these errors.

Microsoft VSS Errors During ASM/ME Operations

When performing ASM/ME operations on a Server 2008 R2 computer (such as creating, mounting, or deleting Smart Copies), you might see errors in the Event Log with the following format:

```
Log Name:           Application
Source:             VSS
Date:              5/13/2009 4:04:56 PM
Event ID:          12289
Task Category:     None
Level:             Error
Keywords:          Classic
User:              N/A
Computer:          TEST-2008R2
Description:
Volume Shadow Copy Service error: Unexpected error
DeviceIoControl(...).
hr = 0x80070001, Incorrect function.
```

```
Operation:
  Exposing Recovered Volumes
  Locating shadow-copy LUNs
  Import Shadow Copies
  Executing Asynchronous Operation
```

You can ignore these error messages.

Windows Server 2008 Constraints

This section describes known issues and usage constraints that are specific to Windows Server 2008.

Disks Offline after a Reboot

Under certain circumstances, disks containing iSCSI SAN volumes (located on your PS Series array) might appear as offline after you reboot your computer.

Use Windows Disk Manager to set the disks online. If the offline disks are associated with applications, you might also need to restart any associated application services. Use the following procedure to set the disks online:

1. Open Server Manager in Windows 2008.
2. Expand the Storage object and open Disk Management. Look for disks marked: Offline.
3. Right-click the offline disks, then select Reactivate Disk.
4. (Optional) Assign a drive letter to the disk.
5. (Optional) Restart any application services associated with the disks.

Incorrect Report of a Device as In Use

Windows Server 2008 and 2012 might incorrectly notify you that a device is in use when you try to log off from an iSCSI target. This issue can occur even though no application is using files on any volume associated with the iSCSI target.

Consequently, the relevant task wizards in Auto-Snapshot Manager (or ASMCLI commands) such as `Unmount` and `Logoff` or `Delete` might display a `Volume in use` error.

If you encounter this problem and you are certain that no application is using the volume, you can select the Ignore option in Auto-Snapshot Manager or you can proceed by setting the disk offline on Windows Server 2008 or 2012 by using the following commands as a workaround:

Note: Following this process (using either the ASM/ME GUI or the ASMCLI command line) when one or more files are in use might result in data loss or corruption.

1. Identify the correct iSCSI target.
2. Launch the command prompt (Click Start, then Run, then type `cmd`).
3. Enter `diskpart` at the Windows command prompt to display the `DISKPART>` prompt.
4. Enter `list volume` to list all volumes known to Windows.
5. Examine the column headed `Volume ###` and identify the volume (or volumes) associated with the iSCSI target.
6. Enter `select volume volume_name`, where `volume_name` is the volume you identified in the previous step.
7. Enter `offline disk` to set the physical disk for the volume offline.
8. Enter `exit` to close the diskpart menu.
9. Enter `exit` to close the command window.

After setting the disk offline, you can successfully log out from the iSCSI target using the iSCSI Initiator GUI or CLI.

VSS Warnings about Unsupported Storage Identifiers

When you create a Smart Copy under Windows Server 2008, the Microsoft Volume Shadow Copy Service (VSS) logs a warning event that contains the following event description:

Volume Shadow Copy Warning: The provider has reported a storage identifier that is not supported by VSS.

For more information, read the Microsoft Knowledge Base article at:

<http://support.microsoft.com/?id=951793>

Networking Constraints

This section contains information about network and firewall configuration, and general networking constraints.

Using Microsoft HPC Server with Broadcom Ethernet NICs

When setting up systems equipped with Broadcom Ethernet NICs to be used as HPC base or compute nodes with iSCSI storage, you might find that the Broadcom card does not accept the IQN string set for it by the HPC server. This failure will cause login failures when the node attempts to boot from its iSCSI volume, because the HPC head node configures the iSCSI boot volumes with IQN-based ACLs.

Two methods resolve this problem. The preferred method involves changing a BIOS setting on the Broadcom card, and using a template string in the HPC settings when configuring the node template. To use this method:

1. Enter the iSCSI boot settings in the Broadcom card, and remove the default IQN string specified there. This step causes the Broadcom card to generate an IQN for itself based on its MAC address and the host name assigned to it via DHCP.
2. In the HPC Node Deployment Wizard's iSCSI Qualified Name Configuration page, select "Use a template string to assign each IQN" and enter the following string:

```
iqn.1995-05.com.broadcom.%MAC-NO-DELIMITERS%.%HOSTNAME%
```

This process should allow the nodes to boot properly. If not, you can compare the IQN displayed by the Broadcom card at boot time to the one set in the boot volume's access page (in the Group Management user interface), and adjust the template string above to match. Consult the Microsoft HPC Server documentation for more information about the template strings you can set in this field.

If you are unable to set a working template string, you can set the Dell EqualLogic HPC iSCSI Provider to use open ACLs on the volumes it creates. To use this method:

1. To start the HPC iSCSI Settings App from the Start Menu: Click **Start**, then **All Programs**, then **EqualLogic**, and then **HPC iSCSI Provider Settings**.
2. Click **Create new volumes with open ACLs**. This option allows any initiator to log in to the volume.

Windows Firewall Settings on Failover Cluster

If you are using the native Windows firewall on your failover cluster and you want to use the Dell EqualLogic Multipath I/O DSM, you must configure your firewall to allow ICMP echo requests (pings) for ICMPv4 and ICMPv6. The installation procedure detects the firewall and gives you the option to amend your firewall configuration automatically.

If you do not select this option at installation time, and you want to use multipathing, you must configure your firewall manually to allow ICMP requests. The following command-line examples show typical exception rules:

```
netsh advfirewall firewall add rule name="Dell EqualLogic MPIO Ping IPv4" dir=in action=allow
description="Dell EqualLogic MultiPath I/O Ping rule" enable=yes profile=any localip=any
remoteip=any protocol=icmpv4
```

```
netsh advfirewall firewall add rule name="Dell EqualLogic MPIO Ping IPv6" dir=in action=allow
description="Dell EqualLogic MultiPath I/O Ping rule" enable=yes profile=any localip=any
remoteip=any protocol=icmpv6
```

Firewall Must Allow ICMP

If you are using the native Windows firewall on your computer and you want to use the Dell EqualLogic Multipath I/O DSM, you must configure your firewall to allow ICMP echo requests (pings). Use the Microsoft iSCSI Initiator Properties Page Extension to verify that Multipath I/O is working correctly. If not, configure the firewall manually to allow ICMP echo requests.

For Windows 2008, use the following procedure to configure your firewall. For other versions of the Windows operating system, see the documentation for your version of Windows:

1. Click **Start**, then **Administrative Tools**, and then **Windows Firewall with Advanced Security**.
2. Click **Inbound Rules** in the **Main** pane and click **New Rule** in the **Actions** pane.
 - a. Check **Custom** and click **Next**.
 - b. Check **All programs** and click **Next**.
 - c. Select **ICMPv4** from the **Protocol type** pull-down list.
 - d. Click **Customize Internet Control Message Protocol (ICMP) settings**.
 - e. Check **Specific ICMP types** and then check **Echo request**.
 - f. Click **OK** and then **Next**.
 - g. Specify the local and remote IP addresses. For each type (local or remote), check either **Any IP Address** or **These IP addresses**. If you check the latter option, you must also type in one or more IP addresses.
 - h. Click **Next** when you have finished specifying IP addresses.
 - i. Check **Allow the connection**, and then click **Next** and look for the options under the label: **When does this rule apply?**

- j. Click any of the `Domain`, `Private`, and `Public` options, depending on the connection type to which the new rule applies, and then click `Next`.
- k. Enter a `Name` for this rule and, optionally, a description. Click `Finish`.

Network Folder Repository for Smart Copy Backup Documents

When you run ASM/ME on a Windows failover cluster, you must specify a shared network folder as a repository for the Smart Copy backup documents. Each node in the cluster must be able to access the folder. In addition, if you are sharing a PS Series group between several failover clusters, each cluster must have its own shared network folder. You cannot use a single shared network folder between multiple clusters for storing backup documents.

iSCSI Initiator Constraints

This section contains general constraints pertaining to the iSCSI Initiator. Any constraints that are related to multipathing are listed in [Multipath I/O DSM on page 32](#).

iSCSI Initiator Connection Failure

The following problem might occur when connecting to a PS Series group:

Under rare conditions, the Microsoft iSCSI Software Initiator might not correctly connect to storage devices, including PS Series volumes and the vss-control volume, which Microsoft services uses to communicate with a PS Series group. Although the login to the volume appears to succeed, the connection is not established. For example, the iSCSI initiator console will not show any device details for the target, and the volume will not appear in the Windows Disk Management utility.

The iSCSI initiator will automatically attempt to correct the problem. However, if the problem persists, you might be able to correct it as follows:

1. Double-click the Microsoft iSCSI initiator icon to open its Properties and click the Targets tab.
2. Log out of the affected iSCSI target.
3. From the Discovery tab, remove the group IP address from the list of target portals.
4. Re-add the group IP address as a target portal and start a new discovery session to the group IP address.
5. Log in to the volumes. You might need to click Advanced to specify host bus adapter information or CHAP login credentials.

If the previous steps do not solve the problem, consider these actions:

- Reboot the computer.
- Use the Windows Device Manager and look for devices that appear to be having problems. For those devices, reinstall the existing driver (use the default response “no” at prompts) and then reboot the server.

Windows OS Error When iSCSI Session Limit Reached

A maximum limit of 255 iSCSI sessions is permitted by the Windows operating system. When you reach this limit, the operating system generates the following iSCSI error: `SDSC_TOO_MANY_SESSIONS: Unspecified`

Error 0xefff001e

Connecting a Host with HBAs to a PS Series Group

If your host system uses HBAs on a dedicated network to access your PS Series groups, configure ASM/ME to register the discovery address using only these HBAs. In the ASM/ME GUI, click Settings, then PS Group Access. Check the box for Use Host Bus Adapters when you configure the PS Series group access. This check box is displayed only if the HIT host has HBAs installed, or an initiator other than the default software initiator.

If a HIT host has HBAs and default network interfaces and if the iSCSI traffic is restricted to only the HBA network interfaces, and you check the box to verify the connection to the group, you might see the following error:

```
"Error saving PS Group <group_name> : Specified group WKAddress is not reachable".
```

If the “Verify connection” option is not checked, ASM will add the new group entry but subsequent attempts to edit it will fail. With the `Use Host Bus Adapters` option set, if the ping test fails, ASM will ignore the failure and attempt to register the new PS Series group. If one HBA succeeds, the group is added.

General Constraints on Operations

The following operational constraints apply in this release for all supported operating systems.

Remote Verification

To perform remote verification for snapshots, the remote verification server must have access to the snapshots of the corresponding volume. You can configure this access through the Group Manager GUI.

To perform remote verification for clones, the remote verification server must have access to the corresponding volume.

To perform remote verification for replicas, the remote verification server must have access to the replication partner group. The remote server should not have any access to the source volumes. If the remote server accesses the original volume, data corruption can occur.

Failover and Failback

HIT does not support failover or failback operations using replicas. For information about supported failover or failback operations on PS Series groups, see the *Dell EqualLogic Group Manager Administrator's Manual*.

Dynamic Disks

Dynamic disks are not supported. This constraint also applies to spanned, striped, mirrored, and RAID 5 volume types on Windows Server 2008.

Local Language Support

None of the Host Integration Tools components are available as local-language variants. You can install and use the English versions under localized variants of supported Windows operating system versions. You might not be able to enter local-language character set glyphs under certain circumstances, such as:

- CHAP user names and passwords
- PS Series Group names, member names, administrative passwords and group membership passwords. For example, Japanese glyphs have a known issue, documented by Microsoft at:
<http://support.microsoft.com/kb/946482>

SCVMM Issues and Constraints

The following issues occur with SCVMM.

Application Issues and Constraints

This section describes issues and workarounds for the applications supported by the Host Integration Tools.

Microsoft Exchange Server Constraints

The following constraints apply when using Host Integration Tools with Microsoft Exchange Server:

- When you use ASM/ME to create Smart Copies of Microsoft Exchange storage groups, the transaction logs are not truncated. See the Microsoft Exchange documentation for information about how to truncate transaction logs.
- For Microsoft Exchange volumes, you can only create Smart Copies of type copy.

Remote Host Settings for Exchange Replica Smart Copy Verification

One of the options to verify a replica Smart Copy of an Exchange component is to promote the replica set to a recovery volume and perform verification. To use this option, the remote host only needs access to the replication partner group. The remote host should not have any access to the source volumes. If the remote host accesses the original volume, data corruption can occur.

Remote Host Settings for Verifying Snapshots and Clones

To verify snapshots and clones on the remote host, the remote host must have access to the corresponding volumes.

Exchange Replica Smart Copies May Require Manual Soft Recovery

When you create a Smart Copy of an Exchange database, ASM/ME will perform verification of the Smart Copy after it is created. Verification consists of two steps: the actual verification, and the “soft recovery,” where the database is brought from a “dirty shutdown” state to a “clean shutdown” state. Soft recovery requires read-write access to the database. In the case of replica Smart Copies, this process requires some additional planning.

Verification and soft recovery of Exchange replica Smart Copies are performed on the replication partner. You can give read-write access to the Smart Copy in the following ways:

- Promote the replica set to a recovery volume
- Clone the replica, creating a new volume

A promoted replica will remain promoted only while verification is running. As soon as verification completes, the replica is demoted again, and replication can resume. However, any changes made to the replica during the soft recovery phase of replication are discarded when the replica is demoted, because replication for any given volume is one-way: no mechanism is available for replicating changes made on the replication partner back to the original volume.

Therefore, if you want to mount a replica Smart Copy of an Exchange database on your Exchange server (for example, during a Restore as New operation in ASM/ME), you must manually run soft recovery on that Smart Copy first, even though soft recovery was run during the verification process. You can perform a manual soft recovery by using the Exchange Eseutil utility.

This restriction applies only to replica Smart Copies. Snapshots and clones do not require this extra step. This issue will be addressed in a future release of ASM/ME.

Exchange Replication Fails After Uninstalling HIT Kit

If you are uninstalling the version 4.5.0, 4.5.1, 4.6.0, or 4.7.0 Host Integration Tools Kits on a host that has Exchange servers configured and performing replication (using DAGs), the replications can fail due to an issue with the trim driver. The driver is not updated correctly while open handles to the PS Series group volumes are involved in the replication.

To avoid this issue, suspend all Exchange replication before upgrading or installing the Host Integration Tools Kit.

SQL Server Constraints

Host Integration Tools supports online backup and quick restore of Microsoft SQL Server databases using Auto-Snapshot Manager GUI. See *Minimum Required Firmware and Software Revisions on page 2* for supported versions of Microsoft SQL Server.

The following constraints apply when using Host Integration Tools with SQL Server:

- Auto-Snapshot Manager does not support SQL Server database object recovery (such as recovering table data). This recovery is available only by using the ASM/ME Restore as New Database option, and by other manual tasks.
- You cannot use Auto-Snapshot Manager to create Smart Copies of multiple databases that span iSCSI volumes. This procedure might result in torn Smart Copies of any databases not selected for the Smart Copy operation. Dell recommends that you create a collection that includes all the databases volumes to avoid torn Smart Copies.
- Selective restoration of databases sharing similar PS Series volumes might take a long time. The file system's copy operation replaces only the selected database files.
- If you select the Apply log option for a single database in a database collection, all the databases remain in a restoring state when the Auto-Snapshot Manager restore process completes.

Separate the System Databases from the User Databases

As a best practice, do not put system databases (Master, Model, MSDB, and TempDB) on the same volumes as user databases. Keeping these databases separate will allow for independent recovery of the user content or the system. It will also prevent problems caused by changes to the systems databases while restoring user content.

SQL Server 2012 Requires Cumulative Update Package 1

If using SQL Server 2012, apply the cumulative update package 1. See the following Knowledge Base article for more information:

<http://support.microsoft.com/kb/2679368>

Restoring SQL 2008 Smart Copies to an SQL 2012 Installation

ASM/ME might report that Smart Copies are compatible between SQL versions. It is possible to restore data from a Smart Copy of an SQL 2008 volume to a volume on an SQL 2012 installation. However, Dell does not recommend restoring data using this method.

Hyper-V Constraints

The following constraints apply to using Host Integration Tools with Hyper-V.

Additional constraints specific to ASM/ME are listed in the *Dell EqualLogic Auto-Snapshot Manager/Microsoft Edition User's Guide*. It is important that you read the User's Guide in addition to these Release Notes before you attempt any operations using Hyper-V.

VMM: Volumes not logged out as expected

When performing a VMM storage management operation that requires the initiator to log out of the volume (such as deleting a volume), sometimes the VMM agent fails to log out (or takes an unusually long time to log out), and the operation fails or times out. A volume cannot be deleted if any connections are still open. VMM does not remove the target for this volume from the list of persistent (favorite) targets and the initiator continues trying to log back in to the volume even after the system is rebooted.

You might also see this issue when performing other operations such as unregistering a volume (LUN), deleting a VM, and rapid VM migration tasks. These operations can result in error messages such as "The session cannot be logged off because a device on that session is currently being used." (ISDSC_DEVICE_BUSY_ON_SESSION)

To work around this issue, you can open the iSCSI initiator and manually disconnect from the target for the volume. Also make sure it is not in the list of favorite targets.

When VMM storage management scenarios involve multiple volumes, manually logging out of each one is time consuming. To script this operation for many volumes at once, you can use Windows 8 iSCSI cmdlets (Get-iSCSISession, Unregister-iSCSISession, Disconnect-iSCSITarget) or Dell EqualLogic PowerShell Tools cmdlets (Get-EqlVolume, Set-EqlVolume, Get-EqlVolumeConnection).

Restoring a Smart Copy of a Hyper-V VM That Has a Hyper-V Snapshot

Consider the following scenario:

1. You have Hyper-V running with one or more VMs. A .vhd file exists for each VM.
2. Create a Hyper-V snapshot of a VM. A new .avhd file is created.
3. Update the VM. For example, install programs, add files, and so on. The .avhd file is updated.
4. Create a snapshot Smart Copy of the VM component.
5. Restore as New from the Smart Copy.

This operation creates a new VM using the static .vhd file from step 1. The interim changes you made to the VM, which are reflected in the .avhd files, are not contained in this file.

A workaround for this issue is available at the following URL:

<http://social.technet.microsoft.com/wiki/contents/articles/6257.manually-merge-avhd-to-vhd-in-hyper-v.aspx>

Event Log Errors from the PlugPlayManager Service

When creating Smart Copies of a running virtual machine, the PlugPlayManager service might log errors to the Windows event log. You can ignore the errors. See the Microsoft Knowledge Base article at:

<http://support.microsoft.com/kb/958669/en-us>

Hyper-V VSS Writer Errors Resulting in a Hang or Crash

When creating Smart Copies on the active node for the first time, certain volume configurations might cause the Hyper-V VSS writer to stop functioning with the following error messages:

```
Failed to revert to VSS snapshot on one or more virtual hard disks of the virtual machine '%1'.  
(Virtual machine ID %2)
```

```
Failed to create the backup of virtual machine '[removed]' (Virtual machine ID CCF1C842-566A-  
446A-96CF-22FDE3744205)
```

```
Cannot find the specified snapshot. (Snapshot ID B09DFE8A-2417-4630-89B9-10424ED2C1FA)
```

```
An unhandled exception was encountered while processing a VSS writer event callback. The VSS  
writer infrastructure is in an unstable state. The writer hosting process must be restarted in  
order to resume VSS functionality.
```

The first error message indicates that the Hyper-V VSS Writer cannot find a required snapshot. The second error message informs you that the Hyper-V VSS Writer is no longer functioning and you must restart it.

The likely cause is that the virtual machine contains multiple volumes configured in the guest but the volumes that are targets of the Smart Copy operation do not contain their `shadowstorage` area. For the Smart Copy operation to be successful, the `shadowstorage` area must be located on the target volume.

To correct the problem, run the `vssadmin` utility within the Guest OS (not the server) to configure the `shadowstorage` of each volume, locating it in the same volume. This one-time operation resolves the problem for all future Smart Copy operations:

1. Open the Windows command prompt.

2. Enter the following command:

```
vssadmin Add ShadowStorage /For=N: /On=N:
```

where N is the Windows drive letter representing the volume. For example:

```
vssadmin Add ShadowStorage /For=D: /On=D:
```

3. Repeat the preceding command for each volume in the virtual machine.
4. Use the following command to verify `shadowstorage` mapping:

```
vssadmin List ShadowStorage
```

If this command returns null, it indicates that VSS is making a default choice for all volumes.

4 Known Issues

This section contains known issues in the current release of HIT/Microsoft and ASM/LE and known issues fixed since the previous release.

Known Issues in HIT/Microsoft version 4.7.1 and 4.7.0

Auto-Snapshot Manager Issues

- An intermittent issue was discovered in Dell EqualLogic Auto-Snapshot Manager Microsoft® Edition (ASM/ME) v4.7 Early Production Access (EPA) related to Smart Copies of Hyper-V™ 2012 R2 objects (including volumes, Collections and Virtual Machines). This issue can potentially prevent Selective Restore operations of those Smart Copies from succeeding. Dell EqualLogic strongly recommends you upgrade to the recommended Dell EqualLogic Host Integration Tools for Microsoft® v4.7 General Availability (GA) release. Then, re-create new Smart Copies of the desired Hyper-V™ objects. Selective Restore operations for Hyper-V™ were previously disabled in ASM/ME v4.7 EPA. This feature has been re-enabled in the ASM/ME v4.7 release.
- The Auto-Snapshot Manager (ASM) cannot create clones of volumes that are using access policies created by a vol admin account.
- The Auto-Snapshot Manager (ASM) agent uses port 7569, by default, to listen for connections from clients. If another service/component is using that port, the ASM agent will not start. The "Could not accept on listening socket" error is generated. If you see this error, check to see if another service/component is using port 7569. If so, assign a different port to that other service/component and try restarting the ASM agent.
- If you cancel the uninstall operation while uninstalling ASM, you might get errors like the following:

```
Error 1905.Module
<some component, DLL, etc>
failed to unregister. HRESULT -2147220472. Contact your support personnel.
```

To resolve these errors, you should run the repair operation to restore all the ASM binaries to a known good state. These errors are caused by a file registration being left in an unusable state after canceling the uninstall. Running the ASM repair operation restores the ASM binaries to a good state. After the repair operation finishes, you can then uninstall ASM.

- You might get "Access is Denied" errors from the Volume Shadow Copy Service (VSS) in Windows Server 2012 Application event logs when Auto-Snapshot Manager (ASM) queries application VSS writers.

To work around these errors, follow the instructions in "Explicitly Controlling User Account Access to a Writer" from the following web page:

[http://msdn.microsoft.com/en-us/library/windows/desktop/aa384605\(v=vs.85\).aspx](http://msdn.microsoft.com/en-us/library/windows/desktop/aa384605(v=vs.85).aspx)

Windows 2012 R2 Hyper-V Cluster Smart Copy Collections Fail During Selective Restore

In April 2014, Microsoft released an update to Windows 2012 R2 detailed in Knowledge Base article KB2919355: *Windows RT 8.1, Windows 8.1, and Windows Server 2012 R2 Update: April 2014* (<http://support.microsoft.com/kb/2919355>).

This Windows update caused the Hyper-V VSS writer to report files in the virtual machine metadata that did not exist in the Smart Copy. Although the Smart Copy operation succeeded, selective restores from the Smart Copy failed when ASM attempted to copy one of the files in the metadata, which did not exist.

This problem was corrected in June 2014, with a hotfix described in KB2966407: *Backing up virtual machines fails when using the CSV writer after installation of update 2010355* (<http://support.microsoft.com/kb/2966407>).

If you performed the Windows 2012 R2 updates described in KB2919355, you must also install KB2966407. Failure to do so results in the creation of Smart Copies that cannot be selectively restored.

Note: After installing KB2966407, selective restores of Smart Copies created prior to applying the hotfix are not corrected, only subsequent selective restores. In-place (Restore All) restore operations, however, are unaffected by this problem. For additional information on restore operations in ASM/ME, see the *Dell™ EqualLogic™ Auto-Snapshot Manager Microsoft® Edition User's Guide*.

Data Center Bridging Limitations of Some Switches

Certain 10Gb network switch models do not fully support DCB for Dell EqualLogic PS Series arrays. Running in such a requirement could result in alerts being reported by the array and incorrect failure of RWSCLI initialization due to an unspecified DCB VLAN ID. To resolve this problem, disable DCB on your network switch.

See the following Technical White Paper for additional information:

<http://en.community.dell.com/techcenter/storage/w/wiki/4355.configuring-dcb-with-equallogic-sans.aspx>

Adding EQL SMP as a Storage Provider on the VMM Server Fails when Using SSO on Windows Server 2012 R2 with SCVMM 2012 R2

To solve this, set the vmmadmin user delegation setting in AD Users and Computers by setting the vmm server delegation setting to "Trust this computer for delegation to any service (Kerberos only)" with SSO enabled in ASM. Then, restart the SCVMM service on the VMM server. You can now add your SMP storage provider along with its associated PS group.

Mount/Unmount Options is Disabled for Microsoft Exchange Replica Smart Copies

The mount/unmount option has been disabled in this release for all Exchange replica Smart Copies. This change supports verification of replica Smart Copies from the source host.

The unmount option deleted the last replica from the replication partner, which can render the last replica Smart Copy as broken. Because the verification process uses mount/unmount functionality, the process has been modified for Exchange replica Smart Copies.

As a workaround, do any of the following:

- Clone a replica, which creates a new volume
- Clone and restore as new
- Clone and create a recovery mailbox database (Exchange 2010 and 2013)

Documentation Omits Information on All Volume Types Supported by ASM

The *Dell EqualLogic Auto-Snapshot Manager/Microsoft Edition User's Guide*, *Dell EqualLogic PowerShell Tools Reference Guide*, and online help only describe support for PS Series volumes using the NTFS file system. However, since HIT/Microsoft version 4.6, which added support for Microsoft Windows 2012, snapshots created for volumes using ReFS, VFS, and CSVFS were also supported. Information in these documents will be revised in the next release of HIT/Microsoft.

Known Issues Fixed Since the Previous Release (HIT/Microsoft Version 4.6)

Selective Restore Is Enabled

The selective restore feature in Hyper-V is enabled in 4.7. The feature was disabled in the 4.7 EPA.

Creating a Thin Clone from a Template Volume with a Non-default RAID Preference

Previously, creating a VM from a VM template that used an EqualLogic template volume with the RAID preference set to a value other than "Automatic" (the default) could fail with the following error: 'Creating snapshot of storage logical unit <template-volume-name> failed with error code SM_RC_UNKNOWN_ERROR. Thin clone RAID preference is inherited from the template and cannot be modified.'

You no longer need to use the PowerShell cmdlets or the Group Manager GUI or CLI to set the RAID preference for the template volume used by the VM template to Automatic.

ASM/ME GUI and SharePoint Clone Smart Copies

Previously, in the ASM/ME GUI, SharePoint clone Smart Copies that were completely mounted might still incorrectly show the `Mount` action as enabled. This problem has been fixed.

The Restore All Operation Now Works Correctly on Smart Copies where the Hostname is Longer than 15 Characters

The Restore All operation now works correctly with Smart Copies when the name of the system where the original Smart Copy was originally taken is longer than 15 characters. However, the operation does not work for Smart Copies taken on SharePoint hosts.

Note: SharePoint Smart Copies created with v4.6 or older on hosts with names greater than 15 characters might not be restorable.

Bulk Smart Copy support was Added for the SharePoint Other Databases Option in the CLI

Bulk Smart Copy support was added for the SharePoint Other Databases option in the CLI. Scheduling and generating Smart Copy commands is also supported.

Search was not changed because the user can manually take a Smart Copy of the one or two SSAs in their farm.

Note: The selective restore wizard of an Other Databases Smart Copy is not enabled because it contains no Content DBs or SSAs. The Restore as New and Mount operations are supported for these Smart Copies.

Multi-Path I/O Large Configuration Handling

Previously, in some configurations involving large numbers of volumes, and sometimes 10 GB connections using the Dell Equallogic Multi-Path I/O DSM, small volumes that were located on a multi-member Equallogic array

might have been given only a single iSCSI connection instead of at least two iSCSI connections. This problem has been addressed.

In some large configurations that are using customized MPIO Connection settings, it might also be necessary to set MPIO Connections settings to these values: Sessions Per Volume = 2 and Max Sessions Per Volume Slice = 2. Set the values by using the ASM GUI MPIO Settings window or using the Set-EqlMpioConfiguration PowerShell cmdlet.

Example of Set-EqlMpioConfiguration:

```
Set-EqlMpioConfiguration -MaxSessionsPerVolumeSlice 2 -MaxSessionsPerEntireVolume 2
```

Online Help Enhancements

The Dell EqualLogic Host Integration Tools for Microsoft online help now correctly displays on Windows 2012 R2 machines when you try to open the help from your local machine.

Known Issues and Constraints in HIT/Microsoft Version 4.6

The following known issues and usage constraints exist in the Host Integration Toolkit version 4.6.

Some workarounds describe changes to the Windows registry. Changing the Windows registry incorrectly can prevent your computer from working properly. You must know how to modify the registry safely and accurately. Never edit the registry unless you create a backup copy and you know how to restore from a backup copy.

Installation

This section contains known issues that pertain to installing the Host Integration Tools. These issues also apply to remote installs, which can be performed from the ASM/ME GUI.

Disable Terminal Services Before Installation

If you have Terminal Services installed on the target computer, you must disable it temporarily before installing the Host Integration Tools. Use the following procedure:

1. Click **Start**, then **Run**.
2. Type `cmd` in the **Open** box, and click **OK**.
3. Type the following command at the command prompt:
`change user /install`
4. Press **ENTER** to display the following message:
`User session is ready to install applications.`
5. Type `exit` at the command prompt, and press **ENTER**.
6. Launch the Host Integration Tools installer as described in the installation guide.

After you complete the installation, enable Terminal Services as follows:

1. Click **Start**, and then **Run**.
2. Type `cmd` in the **Open** box, and click **OK**.

3. Type the following command at the command prompt:
`change user /execute`
4. Press `ENTER` to display the following message:
User session is ready to execute applications.
5. Type `exit` at the command prompt and press `ENTER`.

Installation Failures when Remote Host is Busy

If you are performing a silent installation or a remote installation (using the Add Hosts wizard of the ASM GUI or the `HitRemoteInstall.ps1` PowerShell Script) and you are upgrading an existing version of the Host Integration Tools, the installation will fail if the remote host is in the middle of performing a scheduled ASM operation or other remote users are logged in to the host. The installation process attempts to stop existing services during an upgrade, but this attempt will fail if a scheduled operation is in progress or remote users are performing other HIT operations. Retry the upgrade when the remote host is no longer busy.

Enable the Distributed Transaction Coordinator

When the Microsoft Distributed Transaction Coordinator (MSDTC) service is disabled, it prevents installation of the Microsoft iSCSI Initiator. If the Host Integration Tools installer detects that MSDTC is disabled, it prompts you to enable MSDTC and then retry the installation. Alternatively, you can abort the installation.

PowerShell Tools

This section contains known issues that pertain to the PowerShell Tools.

PowerShell Tools Required for SMP

The Dell EqualLogic PowerShell Tools are always installed with the Host Integration ToolsKit, even with the Custom Install option, and are required when using the Dell EqualLogic SMP.

Using PowerShell Tools with Single Sign-On (SSO)

To use SSO with the PowerShell Tools:

1. Make sure the PS Series group is configured for SSO operation. See the *Dell EqualLogic Group Manager Administrator's Manual* for detailed information.
2. Enable SSO using either the ASM/ME GUI or the PowerShell Tools cmdlet `Set-EqlGroupAccess`.
3. Access the PS Series group (for example, with the PowerShell Tools cmdlet `Get-EqlVolume`).

Note: If you receive a connection error, reboot the host or run the `klist purge` command on the host, and try again.

Using PowerShell and SMP with SSO-Enabled Groups

If you plan to use the PowerShell Tools or SMP to perform SSO authentication in remote scripting tasks (such as through the `Invoke-Command` cmdlet), you must enable credential delegation for the host in Active Directory. Open Active Directory Users and Computers, then the domain name, then the host name, then Properties, then the Delegation tab. See the Microsoft Active Directory documentation for more information.

When using the `Invoke-Command` cmdlet to execute Windows storage management cmdlets (through the SMP) on PS Series groups enabled for Single Sign-On, you must also specify the `-EnableNetworkAccess` parameter.

Dell EqualLogic VDS Provider

The following sections describe general information and known issues that apply to Virtual Disk Service (VDS) tools.

Use Either VDS or Group Manager to Configure CHAP

If you use VDS to configure mutual CHAP Authentication on PS Series volumes, you cannot then switch to the Group Manager GUI to configure mutual CHAP for any other existing or new volumes. Use only VDS to configure CHAP, or unconfigure CHAP and reconfigure it using only the Group Manager.

Erroneous Warnings When Using Storage Manager for SANs

When running Storage Manager for SANs, you might see warnings such as the following in the system event log:

```
Service.GetObject - 'System.ArgumentException - 'Unknown VDS object type specified. Parameter name: type''
```

You can ignore these warnings.

Erroneous Login/Logout Failure When Using Storage Manager for SANs

If you attempt to log in to or log out from an iSCSI target with Storage Manager for SANs, the application might report an error even though the login or logout completed successfully. To avoid this error, use the Microsoft iSCSI initiator interface to log in to or log out from iSCSI targets.

Storage Manager for SANs Permits Invalid Volume Names

Storage Manager for SANs allows you to create volumes with names that contain characters not supported by the PS Series firmware. For example, you can specify spaces or question marks, which are invalid volume name characters.

In addition, Storage Manager for SANs allows you to create multiple volumes with the same name or rename a volume to an existing volume name, which are operations not supported by the PS Series firmware.

If you use Storage Manager for SANs to create volumes with names that include invalid characters or volumes with duplicate names, the Group Manager GUI or CLI will display those volumes with erroneous characters in their names. Dell recommends that you create volumes with names that follow the conventions described in the *Dell EqualLogic Group Manager Administrator's Manual*.

Invalid LUN Message is Reported by DiskRAID

If you use the Microsoft `diskraid` tool to select a LUN, and a computer log in exists for that LUN, the operation might fail with the following error:

```
The LUN you specified is not valid.
```

To resolve this issue, install the Multipath I/O DSM on the computer.

Dell EqualLogic VSS Provider

This section lists known issues that pertain to the Dell EqualLogic VSS Provider.

Problem Recognizing VSS Writers

In response to the following command:

```
vssadmin list writers
```

You will see null output followed by the error message:

```
Error: 0x8000FFFF
```

The following event header might also appear in the application log with a description of the problem:

```
Event Type: Error  
Event Source: VSS  
Event ID: 12302...
```

The event indicates an internal inconsistency. To correct the problem, use the procedure described in the following Microsoft Knowledge Base article:

<http://support.microsoft.com/kb/940184>

Maximum Number of Databases with VSS

According to Microsoft, you might see an error message when you try to create a snapshot of many databases at the same time with SQL Server. The error message states:

```
"ERROR Selected writer 'Microsoft Writer (Service State)' is in failed state"
```

This issue is caused by multiple threads used in the SQL Server process.

To correct the problem, use the procedure described in the following Microsoft Knowledge Base article:

<http://support.microsoft.com/kb/943471>

Remote Setup Wizard

This section provides known issues for the Remote Setup Wizard (RSW).

Timeout When Adding a New Group Member

If you use Remote Setup Wizard (RSW) to add an array to an existing group while the group is under a heavy I/O load, RSW might miss the array initialization acknowledgment. Should you observe an RSW timeout error, use the Group Manager GUI or CLI to verify the new member. If the new member appears, you can close RSW and ignore the timeout error. If the member does not appear, you might need to reset the array and retry the member add operation.

RSW Does Not Configure RAID

When using RSW to add a member to an existing group, it does not assign a RAID policy to the new member. After adding the array to the group, use the Group Manager GUI or CLI to assign a RAID policy. You cannot use the new member's storage space until you assign a RAID policy.

RSW Does Not Configure RAID

When using RSW to add a member to an existing group, it does not assign a RAID policy to the new member. After adding the array to the group, use the Group Manager GUI or CLI to assign a RAID policy. You cannot use the new member's storage space until you assign a RAID policy.

Multipath I/O DSM

This section provides configuration information and known issues for Multipath I/O DSM.

Restore and Restore All Operations in ASM/ME Can Fail to Mount Volumes

When performing Restore and Restore All operations with MPIO enabled, ASM/ME can sometimes fail to mount one or more volumes. The failure to mount a volume occurs more frequently when multiple volumes are involved in the restore operation. To prevent or recover from the problem:

1. Set any application resources using the volumes offline (for example: SQL databases, Hyper-V VMs).
2. Set all the volumes offline in Windows.
3. Log out of all of the volumes in the iSCSI initiator.
4. Verify that all of the volumes are now in the inactive state in the iSCSI initiator.
5. Perform the restore operation again.

Microsoft iSCSI and MPIO Registry Values

When you install the Dell EqualLogic Host Integration Tools kit, the installer sets several registry values that affect iSCSI multipathing behavior. Confirm these values and update if necessary to meet your specific needs. If you modify these values, thoroughly review its impact.

Table 5 summarizes the registry value settings.

Table 5: Registry Value Settings

Registry Path	Value
HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control\Class\{4D36E97B-E325-11CE-BFC1-08002BE10318}\0000\Parameters\LinkDownTime	35
HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\Disk\TimeOutValue	60
HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\mpio\Parameters\PDORemovePeriod	240
HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\mpio\Parameters\UseCustomPathRecoveryInterval	1
HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\mpio\Parameters\PathRecoveryInterval	60
HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\eqldsm\Parameters\PathVerifyEnabled	0
HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\eqldsm\Parameters\PathVerificationPeriod	30

Note: Use the Windows Registry Editor carefully. If you use it incorrectly, you can cause serious problems that might require you to reinstall your operating system.

Limits on iSCSI Sessions with Certain QLogic Drivers

Certain versions of the QLogic HBA driver support only a single iSCSI session - reply from iSCSI target for each adapter port. The Multipath I/O DSM connection manager checks for this limitation and automatically imposes a limit of 1 session - reply from target with a system-wide maximum limit of 128 sessions. Contact your HBA vendor to find out if a driver version that removes this limitation is available.

If you update your QLogic drivers to a version that corrects this session limitation, you must manually reset the sessions limit by deleting the following Windows registry key:

```
HKEY_LOCAL_MACHINE\SOFTWARE\EqualLogic\EHCM\HBA\QLogic Corporation.
```

Note: Visit the QLogic website to check for newer versions of the HBA software.

QLogic iSCSI HBA Restriction on CHAP Credentials

The Multipath I/O DSM connection manager uses temporary CHAP credentials to create additional iSCSI sessions to each target. QLogic iSCSI HBAs do not support the use of CHAP credentials for these sessions. Therefore, to use MPIO in these configurations, you must do one of the following tasks for each target:

- Create a single access control record with the iSCSI initiator name of the host computer.
- Create a single access control record with an IP address range that includes all of the host computer's interfaces.
- Create multiple access control records, one for each of the host computer's interfaces, where each record contains a specific IP addresses.

Intermittent Login Failures With a QLogic iSCSI HBA

Due to a known initiator problem, you might experience intermittent login failures when connecting to volumes or snapshots with a QLogic iSCSI HBA. The threshold at which the problem occurs depends on the group size:

- For a single-member group, the connection threshold is 18 targets.
- For a two-member group, the connection threshold is 9 targets.
- For a group with three or more members, the connection threshold is 6 targets.

Restriction to QLogic SAN Boot Support

If you are configuring multipath I/O on a computer that boots from a SAN and you are using QLogic host bus adapters (HBAs), the following restrictions apply:

- When installing Microsoft iSCSI initiator MPIO support (automatically installed if you install the Multipath I/O DSM), you must reboot the computer three times in order to correctly configure the new software.
- When you install Microsoft iSCSI initiator MPIO support, you cannot uninstall it, and attempting to do so can leave the computer in a non-bootable state.

For more information, see the following Microsoft Knowledge Base articles:

<http://support.microsoft.com/kb/940393>

<http://support.microsoft.com/default.aspx?scid=kb;en-us;952775>

System Clock Changes and Negative Uptimes

If you change the system clock by a significant amount, you might observe negative uptimes reported in the EqualLogic MPIO tab of the iSCSI initiator, and the Host Connection Management service might not properly rebalance iSCSI sessions in response to changes in the SAN configuration. To correct this condition, restart the EHCMSvc. To prevent this problem from arising, ensure that your server's system clock is synchronized properly. For example, when running a virtual machine on an ESX server, you can use the VMware Tools to synchronize the VM system time with the ESX server.

Reduced I/O Performance Under Heavy Disk I/O Load

The performance of a computer that is running Windows Server 2008 R2 or Windows 7 decreases by 20 percent under a heavy disk I/O load. This issue usually occurs on a computer that has more than 8 processors.

To resolve this problem, see the following Microsoft KB article:

<http://support.microsoft.com/kb/982383>

MPIO Driver Failover with Transient Single Failure

Consider the following scenario:

- You have a computer that is running Windows Server 2008 or Windows Server 2008 R2.
- You connect the computer to a storage device that is controlled by Microsoft Multipath I/O (MPIO).
- A transient path failure occurs. For example, a non-perfect SAN fabric that has an occasional frame drops, or a switch port experiences an outage in a short time.

In this scenario, an MPIO path failover occurs incorrectly. The expected behavior is that the Mpio.sys driver can handle the transient device errors and does not trigger the MPIO path failover operation.

The issue occurs because the Mpio.sys driver incorrectly identifies an intermittent path failure as a device failure. Therefore, a MPIO total path failover operation is triggered incorrectly.

To resolve this problem, see the following Microsoft KB article:

<http://support.microsoft.com/kb/2522766>

MPIO Failover Failure on Windows Server 2008 R2

Consider the following scenario:

- You connect a storage device to a computer that is running Windows Server 2008 R2.
- You configure Microsoft Multipath I/O (MPIO) and Microsoft Device Specific Module (MSDSM) as multiple paths that are configured to the storage array.
- A path to the storage device fails and the path failover process starts.

In this scenario, the path failover process fails, and any application that tries to access the storage device might stop responding. Therefore, the MPIO path does not fail over.

To resolve this problem, see the following Microsoft KB article:

<http://support.microsoft.com/kb/2460971>

Stop Error in Mpio.sys Driver in Windows Server 2008 R2

Consider the following scenario:

- You have a computer that is running Windows Server 2008 R2.
- You connect a storage device that is controlled by Microsoft Multipath I/O (MPIO) to the computer.
- The computer is under a heavy backdrop workload.

In this scenario, Windows Server 2008 R2 crashes. Additionally, you receive a Stop error that is similar to the following message:

```
STOP: 0x000000D1 ( parameter1 , parameter2 , parameter3 , parameter4 )
```

```
DRIVER_IRQL_NOT_LESS_OR_EQUAL
```

Notes: The parameters in the Stop error message vary, depending on the configuration of the computer. Not all "0x000000D1" Stop errors are caused by this issue.

To resolve this problem, see the following Microsoft KB article:

<http://support.microsoft.com/kb/2511962>

Auto-Snapshot Manager

This section provides known issues in ASM/ME.

Promoting a Replica Smart Copy on a Different Computer

To promote a replica Smart Copy on a different computer than the one that created it, the computer must be running Auto-Snapshot Manager and must have access to the secondary group storing the replica set. In addition, the backup documents must be available to the computer. Dell recommends that you store backup documents on a file share accessible to both computers.

ASM/ME GUI and SharePoint Clone Smart Copies

In the ASM/ME GUI, SharePoint clone Smart Copies that have been completely mounted might still incorrectly show the `Mount` action as enabled.

Power Loss During a Volume Rethin Operation

If power is lost during a volume rethinning operation, the temporary file that is created during the operation can remain in the root directory of the volume being rethinned. The temporary file will have a file name in the form `eqt_*.tmp`. Delete this file after the system restarts.

Using SSO with ASM/ME

When enabling Single Sign-On (SSO) using ASM, the account that the ASM service runs under is used to test access to the PS Series group. This process can result in a warning if ASM is running as a local administrator or an account without PS Series group access. However, when users execute PowerShell cmdlets, their own credentials are used, not the credentials for the ASM service.

EQLASMAgent Service Fails To Start Without Internet Access

The EQLXPerf service might fail to start when the service does not have access to the Internet because .NET attempts to download the Certificate Revocation List from VeriSign to ensure the application's validity. The workaround is to increase the service timeout. See the Microsoft Knowledge Base article at:

<http://support.microsoft.com/kb/941990>

This problem might also cause other HIT components, such as Auto-Snapshot Manager, to start more slowly.

Restoring Volumes with Multiple Mount Points

ASM/ME and ASMCLI cannot correctly restore volumes that are mounted in multiple locations. For example, a volume mounted on mount points E:\ and D:\ will not restore correctly. To work around this problem, remove the volume's extra mount points before performing a restore.

Clone of a Replica Volume Does Not Retain Drive Letter

If you clone a replica volume using ASM/ME, the mounted clone will not retain the drive letter of the original source volume. You will be able to log in to the volume via the iSCSI initiator and set it online. However, it will not have a drive letter assigned to it. This issue occurs when you are replicating via ASM/ME from a Windows Server 2003 system to a Windows Server 2008 system, or if you are replicating via ASM/ME across two Windows Server 2003 systems.

To view the appropriate drive letter for the cloned replica, perform the following steps:

1. Open the Windows diskpart utility: Click **Start**, **Run**, then type `diskpart`.
2. Type `list volume` to view existing volumes and their properties.
3. Select the clone volume by typing `select volume #`, where # is the numerical value of the volume number for the clone. For example, if volume 5 is the clone, type `select volume 5`.
4. View the volume attributes for the clone by typing `attributes volume`.
5. If the Read-only, Hidden, and No Default Drive Letter attributes are set to Yes, then clear these three attributes by entering the following commands:
 - Type `attributes volume clear nodefauldriverletter`. You will see a confirmation message that the attribute cleared successfully.
 - Type `attributes volume clear readonly`. You will see a confirmation message that the attribute cleared successfully.
 - Type `attributes volume clear hidden`. You will see a confirmation message that the attribute cleared successfully.

6. Reboot the machine. The appropriate drive letter of the original source volume should now appear for the clone.

Error: VSS Can No Longer Hold I/O Writes

VSS imposes a limit on the time it takes to create a Smart Copy. Smart Copies involving many volumes might exceed this time limit. ASM/ME displays an error stating that VSS can no longer hold I/O writes. To resolve this problem, reduce the number of volumes included in the Smart Copy. You might also have to reduce the number of volumes in collections.

Error After Refreshing GUI

In the following situations, the Auto-Snapshot Manager GUI might report an error when you refresh the GUI to view Smart Copies:

- You stop or restart the Auto-Snapshot Manager while the Microsoft VSS service is running.
- You stop or restart the Microsoft VSS service while the Auto-Snapshot Manager GUI is running.

Use the following procedure to view Smart Copies:

1. Close the Auto-Snapshot Manager GUI.
2. Stop the Microsoft VSS service by using the `net stop vss` command.
3. Stop the VSS provider by using the command: `net stop eqlvss`
4. Start the ASM/ME GUI. This restarts the VSS provider and VSS requestor.

Smart Copy Import Error

If you try to import a Smart Copy with a VSS application other than Auto-Snapshot Manager, you might see an error if the Smart Copy credentials have not yet been fully propagated to all the PS Series group members. In this case, wait and retry the import after a few minutes.

Smart Copy Import Not Supported For Older Versions

You cannot import Smart Copies that you created using Auto-Snapshot Manager version 2.2 or a previous version.

Volume Mapping Not In Alphabetical Order

After restoring all the databases in a Smart Copy as new databases (using the Restore All as New operation), the volume mapping for new databases might not be in alphabetical order. You can manually map the volumes to drive letters to create the proper volume mapping.

Threshold For Smart Copy Logins When Using QLogic HBA

When using a QLogic iSCSI HBA with Auto-Snapshot Manager, a Windows server can persistently log in to a maximum of 30 Smart Copies at one time.

Error During Restore Operation: Volume In Use

If you try to perform a restore operation, and an application is using the volume or an open Windows Explorer session is connected to the volume, the operation will fail, and Auto-Snapshot Manager will display an error

indicating that the volume is in use. If this problem occurs, close the application or Explorer session and click Retry. In Windows Server 2008, this error might occur even after all Explorer sessions are closed. In this case, click Ignore, and the restore will proceed normally.

Volume Mapping Not In Alphabetical Order

After restoring all the databases in a Smart Copy as new databases (using the Restore All as New operation), the volume mapping for new databases might not be in alphabetical order. You can manually map the volumes to drive letters to create the proper volume mapping.

Tools and Utilities

This section contains known issues about Tools and Utilities, such as the EqlLog and EqlXcp utilities.

Restrictions for Using the EqlXcp Utility

The EqlXcp utility will exit with an error if any of the following rules are not met. No data will be lost.

- To use this utility, you must have the `SE_MANAGE_VOLUME_NAME` privilege. Administrators have this privilege by default.
- You can only copy between volumes on a single group.
- The source and destination volumes must reside on a PS Series array.
- The array must be running firmware version 5.0 or higher.
- You cannot use this utility on compressed or sparse files. (Sparse files are files that are thin-provisioned on the NTFS filesystem).
- `EqlXcp.exe` is not supported on volumes that are cluster resources.

EqlLog Utility Not Supported on Windows 2008 Core (non-R2)

Internet Explorer 5 is required to install the .NET framework, and because Internet Explorer 5 is nonexistent on Windows 2008 Core (non-R2) systems, the EqlLog utility will not work on Windows 2008 Core (non-R2) systems.

SAN Boot Volume

The following requirements and known issues apply to the SAN Boot Volume.

Booting From A SAN Boot Volume on PS Series Groups

- Because of a known constraint in Microsoft Windows Server 2008, you cannot create replicas of SAN boot volumes. However, you can create replicas of SAN boot volumes if you are running Microsoft Windows Server 2008 R2.
- You must use the appropriate version of the Microsoft iSCSI initiator. See the Microsoft *iSCSI Initiator User's Guide*. You can download the guide from microsoft.com (search the site for Microsoft iSCSI Initiator).

- When using the Dell EqualLogic Multipath I/O DSM, Dell recommends that you place the computer's virtual memory paging file on a local volume and not on a PS Series iSCSI volume.

For more information about SAN boot volumes, see the Microsoft Knowledge Base article at:

<http://support.microsoft.com/default.aspx/kb/305547>

Unmounting a Boot Volume Fails For Collection Smart Copies

When you unmount a Smart Copy of a collection that contains a boot volume, the unmount of the boot volume will fail and the following error message is displayed: "Volume is in use. Close any Explorer windows that may be using this volume. Disconnect all applications that might be using this volume."

No workaround is available for this issue. However, all other non-boot volumes in the collection will unmount successfully.

Appendix A Third-Party Copyright Information

This section contains third-party copyright and licensing information for third-party owned software used in Host Integration Tools for Microsoft version 4.7.1.

Boost 1.52

Boost Software License - Version 1.0 - August 17th, 2003

Permission is hereby granted, free of charge, to any person or organization obtaining a copy of the software and accompanying documentation covered by this license (the “Software”) to use, reproduce, display, distribute, execute, and transmit the Software, and to prepare derivative works of the Software, and to permit third-parties to whom the Software is furnished to do so, all subject to the following:

The copyright notices in the Software and this entire statement, including the above license grant, this restriction and the following disclaimer, must be included in all copies of the Software, in whole or in part, and all derivative works of the Software, unless such copies or derivative works are solely in the form of machine-executable object code generated by a source language processor.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE AND NON-INFRINGEMENT. IN NO EVENT SHALL THE COPYRIGHT HOLDERS OR ANYONE DISTRIBUTING THE SOFTWARE BE LIABLE FOR ANY DAMAGES OR OTHER LIABILITY, WHETHER IN CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Cryptographic Software

This product includes cryptographic software written by Eric Young (eay@cryptsoft.com). This product includes software written by Tim Hudson (tjh@cryptsoft.com).

Original SSLeay License

Copyright (C) 1995-1998 Eric Young (eay@cryptsoft.com)

All rights reserved.

This package is an SSL implementation written by Eric Young (eay@cryptsoft.com).

The implementation was written so as to conform with Netscapes SSL. This library is free for commercial and non-commercial use as long as the following conditions are adhered [sic] to. The following conditions apply to all code found in this distribution, be it the RC4, RSA, lhash, DES, etc., code; not just the SSL code. The SSL documentation included with this distribution is covered by the same copyright terms except that the holder is Tim Hudson (tjh@cryptsoft.com).

Copyright remains Eric Young's, and as such any Copyright notices in the code are not to be removed.

If this package is used in a product, Eric Young should be given attribution as the author of the parts of the library used. This can be in the form of a textual message at program startup or in documentation (online or

textual) provided with the package. Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. All advertising materials mentioning features or use of this software must display the following acknowledgement: “This product includes cryptographic software written by Eric Young (eyay@cryptsoft.com)”
The word 'cryptographic' can be left out if the routines [sic] from the library being used are not cryptographic related. :-) [sic]
4. If you include any Windows specific code (or a derivative thereof) from the apps directory (application code) you must include an acknowledgement: “This product includes software written by Tim Hudson (tjh@cryptsoft.com)”

THIS SOFTWARE IS PROVIDED BY ERIC YOUNG "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

The licence and distribution terms for any publically [sic] available version or derivative of this code cannot be changed. i.e. this code cannot simply be copied and put under another distribution licence [including the GNU Public Licence.]

DotNETZipLib

Microsoft Public License (Ms-PL)

This license governs use of the accompanying software, the DotNetZip library (“the software”). If you use the software, you accept this license. If you do not accept the license, do not use the software.

1. Definitions

The terms “reproduce,” “reproduction,” “derivative works” and “distribution” have the same meaning here as under U.S. copyright law. A “contribution” is the original software, or any additions or changes to the software. A “contributor” is any person that distributes its contribution under this license. “Licensed patents” are a contributor's patent claims that read directly on its contribution.

2. Grant of Rights

(A) Copyright Grant- Subject to the terms of this license, including the license conditions and limitations in section 3, each contributor grants you a non-exclusive, worldwide, royalty-free copyright license to reproduce its

contribution, prepare derivative works of its contribution, and distribute its contribution or any derivative works that you create.

(B) Patent Grant- Subject to the terms of this license, including the license conditions and limitations in section 3, each contributor grants you a non-exclusive, worldwide, royalty-free license under its licensed patents to make, have made, use, sell, offer for sale, import, and/or otherwise dispose of its contribution in the software or derivative works of the contribution in the software.

3. Conditions and Limitations

(A) No Trademark License- This license does not grant you rights to use any contributors' name, logo, or trademarks.

(B) If you bring a patent claim against any contributor over patents that you claim are infringed by the software, your patent license from such contributor to the software ends automatically.

(C) If you distribute any portion of the software, you must retain all copyright, patent, trademark, and attribution notices that are present in the software.

(D) If you distribute any portion of the software in source code form, you may do so only under this license by including a complete copy of this license with your distribution. If you distribute any portion of the software in compiled or object code form, you may only do so under a license that complies with this license.

(E) The software is licensed “as is.” You bear the risk of using it. The contributors give no express warranties, guarantees or conditions. You may have additional consumer rights under your local laws which this license cannot change. To the extent permitted under your local laws, the contributors exclude the implied warranties of merchantability, fitness for a particular purpose and non-infringement.

MIT Kerberos License

Copyright 2008 Massachusetts Institute of Technology. All Rights Reserved.

Export of this software from the United States of America may require a specific license from the United States Government.

It is the responsibility of any person or organization contemplating export to obtain such a license before exporting.

WITHIN THAT CONSTRAINT, permission to use, copy, modify, and distribute this software and its documentation for any purpose and without fee is hereby granted, provided that the above copyright notice appear in all copies and that both that copyright notice and this permission notice appear in supporting documentation, and that the name of M.I.T. not be used in advertising or publicity pertaining to distribution of the software without specific, written prior permission. Furthermore if you modify this software you must label your software as modified software and not distribute it in such a fashion that it might be confused with the original M.I.T. software.

M.I.T. makes no representations about the suitability of this software for any purpose. It is provided “as is” without express or implied warranty.

OpenSSL

The OpenSSL toolkit stays under a dual license, i.e. both the conditions of the OpenSSL License and the original SSLeay license apply to the toolkit. Both licenses are BSD-style Open Source licenses. In case of any license issues related to OpenSSL please contact openssl-core@openssl.org.

OpenSSL License

Copyright (c) 1998-2008 The OpenSSL Project. All rights reserved.

This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit.
(<http://www.openssl.org/>)

This product includes cryptographic software written by Eric Young (ey@cryptsoft.com).

This product includes software written by Tim Hudson (tjh@cryptsoft.com).

This product includes software developed by the University of California, Lawrence Berkeley Laboratory and its contributors.

This product includes software developed by the Kungliga Tekniska Högskolan and its contributors.

This product includes software developed by Yen Yen Lim and North Dakota State University.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. All advertising materials mentioning features or use of this software must display the following acknowledgment: "This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (<http://www.openssl.org/>)"
4. The names "OpenSSL Toolkit" and "OpenSSL Project" must not be used to endorse or promote products derived from this software without prior written permission. For written permission, please contact openssl-core@openssl.org.
5. Products derived from this software may not be called "OpenSSL" nor may "OpenSSL" appear in their names without prior written permission of the OpenSSL Project.
6. Redistributions of any form whatsoever must retain the following acknowledgment:

"This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit
(<http://www.openssl.org/>)"

THIS SOFTWARE IS PROVIDED BY THE OpenSSL PROJECT "AS IS" AND ANY EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO

EVENT SHALL THE OpenSSL PROJECT OR ITS CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

SimpleINI

The licence text below is the boilerplate “MIT Licence” used from: <http://www.opensource.org/licenses/mit-license.php>

Copyright (c) 2006-2008, Brodie Thiesfield

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the “Software”), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED “AS IS”, WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Thrift

Apache License

Version 2.0, January 2004

<http://www.apache.org/licenses/>

TERMS AND CONDITIONS FOR USE, REPRODUCTION, AND DISTRIBUTION

1. Definitions.

“License” shall mean the terms and conditions for use, reproduction, and distribution as defined by Sections 1 through 9 of this document. “Licensor” shall mean the copyright owner or entity authorized by the copyright owner that is granting the License. “Legal Entity” shall mean the union of the acting entity and all other entities that control, are controlled by, or are under common control with that entity. For the purposes of this definition, “control” means (i) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (ii) ownership of fifty percent (50%) or more of the outstanding shares, or (iii) beneficial ownership of such entity. “You” (or “your”) shall mean an individual or Legal Entity exercising permissions granted by this License. “Source” form shall mean the preferred form for making modifications,

including but not limited to software source code, documentation source, and configuration files. “Object” form shall mean any form resulting from mechanical transformation or translation of a Source form, including but not limited to compiled object code, generated documentation, and conversions to other media types. “Work” shall mean the work of authorship, whether in Source or Object form, made available under the License, as indicated by a copyright notice that is included in or attached to the work (an example is provided in the Appendix below). “Derivative Works” shall mean any work, whether in Source or Object form, that is based on (or derived from) the Work and for which the editorial revisions, annotations, elaborations, or other modifications represent, as a whole, an original work of authorship. For the purposes of this License, Derivative Works shall not include works that remain separable from, or merely link (or bind by name) to the interfaces of, the Work and Derivative Works thereof. “Contribution” shall mean any work of authorship, including the original version of the Work and any modifications or additions to that Work or Derivative Works thereof, that is intentionally submitted to Licensor for inclusion in the Work by the copyright owner or by an individual or Legal Entity authorized to submit on behalf of the copyright owner. For the purposes of this definition, “submitted” means any form of electronic, verbal, or written communication sent to the Licensor or its representatives, including but not limited to communication on electronic mailing lists, source code control systems, and issue tracking systems that are managed by, or on behalf of, the Licensor for the purpose of discussing and improving the Work, but excluding communication that is conspicuously marked or otherwise designated in writing by the copyright owner as “Not a Contribution.” “Contributor” shall mean Licensor and any individual or Legal Entity on behalf of whom a Contribution has been received by Licensor and subsequently incorporated within the Work.

2. Grant of Copyright License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable copyright license to reproduce, prepare Derivative Works of, publicly display, publicly perform, sublicense, and distribute the Work and such Derivative Works in Source or Object form.

3. Grant of Patent License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable (except as stated in this section) patent license to make, have made, use, offer to sell, sell, import, and otherwise transfer the Work, where such license applies only to those patent claims licensable by such Contributor that are necessarily infringed by their Contribution(s) alone or by combination of their Contribution(s) with the Work to which such Contribution(s) was submitted. If You institute patent litigation against any entity (including a cross-claim or counterclaim in a lawsuit) alleging that the Work or a Contribution incorporated within the Work constitutes direct or contributory patent infringement, then any patent licenses granted to You under this License for that Work shall terminate as of the date such litigation is filed.

4. Redistribution. You may reproduce and distribute copies of the Work or Derivative Works thereof in any medium, with or without modifications, and in Source or Object form, provided that You meet the following conditions: (a) You must give any other recipients of the Work or Derivative Works a copy of this License; and (b) You must cause any modified files to carry prominent notices stating that You changed the files; and (c) You must retain, in the Source form of any Derivative Works that You distribute, all copyright, patent, trademark, and attribution notices from the Source form of the Work, excluding those notices that do not pertain to any part of the Derivative Works; and (d) If the Work includes a “NOTICE” text file as part of its distribution, then any Derivative Works that You distribute must include a readable copy of the attribution notices contained within such NOTICE file, excluding those notices that do not pertain to any part of the Derivative Works, in at least one of the following places: within a NOTICE text file distributed as part of the Derivative Works; within the Source form or documentation, if provided along with the Derivative Works; or, within a display generated by the Derivative Works, if and wherever such third-party notices normally appear. The contents of the NOTICE file are for informational purposes only and do not modify the License. You may add Your own attribution notices within Derivative Works that You distribute, alongside or as an addendum to the NOTICE text from the Work, provided that such additional attribution notices cannot be construed as modifying the License. You may

add Your own copyright statement to Your modifications and may provide additional or different license terms and conditions for use, reproduction, or distribution of Your modifications, or for any such Derivative Works as a whole, provided Your use, reproduction, and distribution of the Work otherwise complies with the conditions stated in this License.

5. Submission of Contributions. Unless You explicitly state otherwise, any Contribution intentionally submitted for inclusion in the Work by You to the Licensor shall be under the terms and conditions of this License, without any additional terms or conditions. Notwithstanding the above, nothing herein shall supersede or modify the terms of any separate license agreement you may have executed with Licensor regarding such Contributions.

6. Trademarks. This License does not grant permission to use the trade names, trademarks, service marks, or product names of the Licensor, except as required for reasonable and customary use in describing the origin of the Work and reproducing the content of the NOTICE file.

7. Disclaimer of Warranty. Unless required by applicable law or agreed to in writing, Licensor provides the Work (and each Contributor provides its Contributions) on an “AS IS” BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied, including, without limitation, any warranties or conditions of TITLE, NON-INFRINGEMENT, MERCHANTABILITY, or FITNESS FOR A PARTICULAR PURPOSE. You are solely responsible for determining the appropriateness of using or redistributing the Work and assume any risks associated with Your exercise of permissions under this License.

8. Limitation of Liability. In no event and under no legal theory, whether in tort (including negligence), contract, or otherwise, unless required by applicable law (such as deliberate and grossly negligent acts) or agreed to in writing, shall any Contributor be liable to You for damages, including any direct, indirect, special, incidental, or consequential damages of any character arising as a result of this License or out of the use or inability to use the Work (including but not limited to damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses), even if such Contributor has been advised of the possibility of such damages.

9. Accepting Warranty or Additional Liability. While redistributing the Work or Derivative Works thereof, You may choose to offer, and charge a fee for, acceptance of support, warranty, indemnity, or other liability obligations and/or rights consistent with this License. However, in accepting such obligations, You may act only on Your own behalf and on Your sole responsibility, not on behalf of any other Contributor, and only if You agree to indemnify, defend, and hold each Contributor harmless for any liability incurred by, or claims asserted against, such Contributor by reason of your accepting any such warranty or additional liability.

END OF TERMS AND CONDITIONS

APPENDIX: How to apply the Apache License to your work.

To apply the Apache License to your work, attach the following boilerplate notice, with the fields enclosed by brackets “[]” replaced with your own identifying information. (Don't include the brackets!) The text should be enclosed in the appropriate comment syntax for the file format. We also recommend that a file or class name and description of purpose be included on the same “printed page” as the copyright notice for easier identification within third-party archives.

Copyright [yyyy] [name of copyright owner]

Licensed under the Apache License, Version 2.0 (the “License”); you may not use this file except in compliance with the License. You may obtain a copy of the License at <http://www.apache.org/licenses/LICENSE-2.0>

Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an “AS IS” BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

SOFTWARE DISTRIBUTED WITH THRIFT:

The Apache Thrift software includes a number of subcomponents with separate copyright notices and license terms. Your use of the source code for these subcomponents is subject to the terms and conditions of the following licenses.

The following files are licensed under the MIT License:

lib/erl/build/beamver

lib/erl/build/buildtargets.mk

lib/erl/build/colors.mk

lib/erl/build/docs.mk

lib/erl/build/mime.types

lib/erl/build/otp.mk

lib/erl/build/otp_subdir.mk

lib/erl/build/raw_test.mk

lib/erl/src/Makefile

Please see doc/otp-base-license.txt for the full terms of this license. The following files contain some portions of code contributed under the Thrift Software License (see doc/old-thrift-license.txt), and relicensed under the Apache 2.0 License:

compiler/cpp/Makefile.am

compiler/cpp/src/generate/t_cocoa_generator.cc

compiler/cpp/src/generate/t_cpp_generator.cc

compiler/cpp/src/generate/t_csharp_generator.cc

compiler/cpp/src/generate/t_erl_generator.cc

compiler/cpp/src/generate/t_hs_generator.cc

compiler/cpp/src/generate/t_java_generator.cc

compiler/cpp/src/generate/t_ocaml_generator.cc

compiler/cpp/src/generate/t_perl_generator.cc

compiler/cpp/src/generate/t_php_generator.cc

compiler/cpp/src/generate/t_py_generator.cc
compiler/cpp/src/generate/t_rb_generator.cc
compiler/cpp/src/generate/t_st_generator.cc
compiler/cpp/src/generate/t_xsd_generator.cc
compiler/cpp/src/main.cc
compiler/cpp/src/parse/t_field.h
compiler/cpp/src/parse/t_program.h
compiler/cpp/src/platform.h
compiler/cpp/src/thriftl.ll
compiler/cpp/src/thrift.yy
lib/csharp/src/Protocol/TBinaryProtocol.cs
lib/csharp/src/Protocol/TField.cs
lib/csharp/src/Protocol/TList.cs
lib/csharp/src/Protocol/TMap.cs
lib/csharp/src/Protocol/TMessage.cs
lib/csharp/src/Protocol/TMessageType.cs
lib/csharp/src/Protocol/TProtocol.cs
lib/csharp/src/Protocol/TProtocolException.cs
lib/csharp/src/Protocol/TProtocolFactory.cs
lib/csharp/src/Protocol/TProtocolUtil.cs
lib/csharp/src/Protocol/TSet.cs
lib/csharp/src/Protocol/TStruct.cs
lib/csharp/src/Protocol/TType.cs
lib/csharp/src/Server/TServer.cs
lib/csharp/src/Server/TSimpleServer.cs
lib/csharp/src/Server/TThreadPoolServer.cs
lib/csharp/src/TApplicationException.cs

lib/csharp/src/Thrift.csproj
lib/csharp/src/Thrift.sln
lib/csharp/src/TProcessor.cs
lib/csharp/src/Transport/TServerSocket.cs
lib/csharp/src/Transport/TServerTransport.cs
lib/csharp/src/Transport/TSocket.cs
lib/csharp/src/Transport/TStreamTransport.cs
lib/csharp/src/Transport/TTransport.cs
lib/csharp/src/Transport/TTransportException.cs
lib/csharp/src/Transport/TTransportFactory.cs
lib/csharp/ThriftMSBuildTask/Properties/AssemblyInfo.cs
lib/csharp/ThriftMSBuildTask/ThriftBuild.cs
lib/csharp/ThriftMSBuildTask/ThriftMSBuildTask.csproj
lib/rb/lib/thrift.rb
lib/st/README
lib/st/thrift.st
test/OptionalRequiredTest.cpp
test/OptionalRequiredTest.thrift
test/ThriftTest.thrift

For the aclocal/ax_boost_base.m4 and contrib/fb303/aclocal/ax_boost_base.m4 components:

Copyright (c) 2007 Thomas Porschberg thomas@randspringer.de Copying and distribution of this file, with or without modification, are permitted in any medium without royalty provided the copyright notice and this notice are preserved.

For the compiler/cpp/src/md5.[ch] components:

Copyright (C) 1999, 2000, 2002 Aladdin Enterprises. All rights reserved.

This software is provided 'as-is', without any express or implied warranty. In no event will the authors be held liable for any damages arising from the use of this software. Permission is granted to anyone to use this software for any purpose, including commercial applications, and to alter it and redistribute it freely, subject to the following restrictions:

1. The origin of this software must not be misrepresented; you must not claim that you wrote the original software. If you use this software in a product, an acknowledgment in the product documentation would be appreciated but is not required.
2. Altered source versions must be plainly marked as such, and must not be misrepresented as being the original software.
3. This notice may not be removed or altered from any source distribution.

L. Peter Deutsch

ghost@aladdin.com

For the lib/rb/setup.rb: Copyright (c) 2000-2005 Minero Aoki,

lib/ocaml/OCamlMakefile and lib/ocaml/README-OCamlMakefile components:

Copyright (C) 1999 - 2007 Markus Mottl

Licensed under the terms of the GNU Lesser General Public License 2.1

(see doc/lgpl-2.1.txt for the full terms of this license)

WinPCAP

Copyright (c) 1999 - 2005 NetGroup, Politecnico di Torino (Italy).

Copyright (c) 2005 - 2009 CACE Technologies, Davis (California).

All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. Neither the name of the Politecnico di Torino, CACE Technologies nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING

IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

This product includes software developed by the University of California, Lawrence Berkeley Laboratory and its contributors.

This product includes software developed by the Kungliga Tekniska Högskolan and its contributors.

This product includes software developed by Yen Yen Lim and North Dakota State University.

Portions Copyright (c) 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997 The Regents of the University of California. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. All advertising materials mentioning features or use of this software must display the following acknowledgement: "This product includes software developed by the University of California, Berkeley and its contributors."
4. Neither the name of the University nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE INSTITUTE AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE REGENTS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE. Portions Copyright (c) 1983 Regents of the University of California. All rights reserved.

Redistribution and use in source and binary forms are permitted provided that the above copyright notice and this paragraph are duplicated in all such forms and that any documentation, advertising materials, and other materials related to such distribution and use acknowledge that the software was developed by the University of California, Berkeley. The name of the University may not be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Portions Copyright (c) 1995, 1996, 1997 Kungliga Tekniska Högskolan (Royal Institute of Technology, Stockholm, Sweden). All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. All advertising materials mentioning features or use of this software must display the following acknowledgement: "This product includes software developed by the Kungliga Tekniska Högskolan and its contributors."
4. Neither the name of the University nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE INSTITUTE AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE INSTITUTE OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE. Portions Copyright (c) 1997 Yen Yen Lim and North Dakota State University. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. All advertising materials mentioning features or use of this software must display the following acknowledgement: "This product includes software developed by Yen Yen Lim and North Dakota State University."
4. The name of the author may not be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE AUTHOR "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY,

WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE. Portions Copyright (c) 1993 by Digital Equipment Corporation.

Permission to use, copy, modify, and distribute this software for any purpose with or without fee is hereby granted, provided that the above copyright notice and this permission notice appear in all copies, and that the name of Digital Equipment Corporation not be used in advertising or publicity pertaining to distribution of the document or software without specific, written prior permission.

THE SOFTWARE IS PROVIDED "AS IS" AND DIGITAL EQUIPMENT CORP. DISCLAIMS ALL WARRANTIES WITH REGARD TO THIS SOFTWARE, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS. IN NO EVENT SHALL DIGITAL EQUIPMENT CORPORATION BE LIABLE FOR ANY SPECIAL, DIRECT, INDIRECT, OR CONSEQUENTIAL DAMAGES OR ANY DAMAGES WHATSOEVER RESULTING FROM LOSS OF USE, DATA OR PROFITS, WHETHER IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS SOFTWARE. Portions Copyright (C) 1995, 1996, 1997, 1998, and 1999 WIDE Project. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. Neither the name of the project nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE PROJECT AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE PROJECT OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE. Portions Copyright (c) 1996 Juniper Networks, Inc. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that: (1) source code distributions retain the above copyright notice and this paragraph in its entirety, (2) distributions including binary code include the above copyright notice and this paragraph in its entirety in the documentation or other materials provided with the distribution. The name of Juniper Networks may not be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF

MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Portions Copyright (c) 2001 Daniel Hartmeier All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

- Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
- Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTOR "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT HOLDERS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE. Portions Copyright 1989 by Carnegie Mellon.

Permission to use, copy, modify, and distribute this program for any purpose and without fee is hereby granted, provided that this copyright and permission notice appear on all copies and supporting documentation, the name of Carnegie Mellon not be used in advertising or publicity pertaining to distribution of the program without specific prior permission, and notice be given in supporting documentation that copying and distribution is by permission of Carnegie Mellon and Stanford University. Carnegie Mellon makes no representations about the suitability of this software for any purpose. It is provided "as is" without express or implied warranty.

